

Advanced Supported Liquid Membranes for Ammonia and Formaldehyde Control in Spacesuits, Phase I

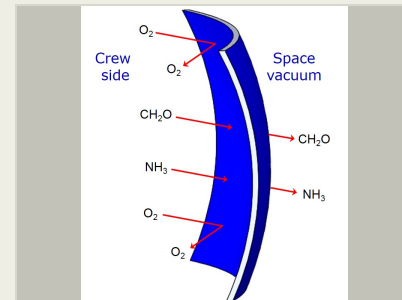
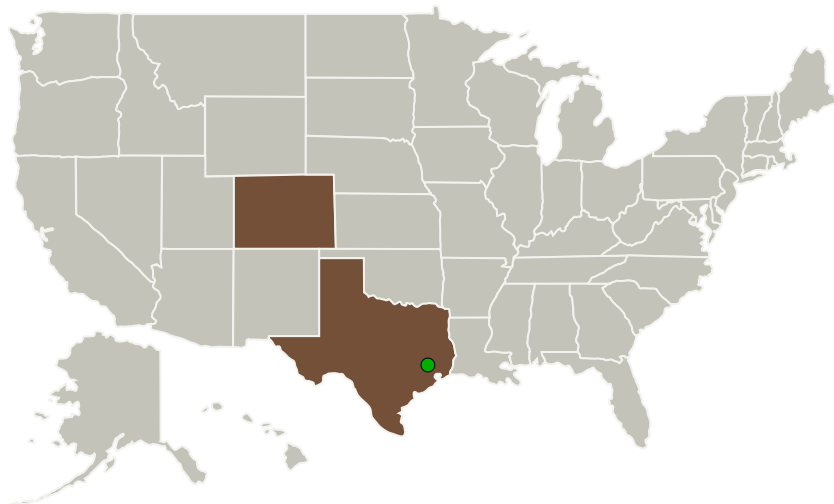
Completed Technology Project (2016 - 2016)



Project Introduction

With plans to transition to the Rapid Cycle Amine system for CO₂ control in the Portable Life Support System used for extra vehicular activities (EVA), NASA has a need to improve the method for controlling trace contaminants, specifically ammonia (NH₃) and formaldehyde (CH₂O), which have the potential to exceed space craft maximum allowable concentrations (SMAC) by the end of the EVA. A very simple way to remove ammonia and formaldehyde would be with a membrane that would allow ammonia and formaldehyde to escape to space vacuum while retaining oxygen (O₂). Reaction Systems, Inc. (RSI) proposes to develop a supported liquid membrane (SLM) that incorporates a facilitated transport mechanism for the control of ammonia and formaldehyde in spacesuits. An SLM consists of a reactive liquid supported within a porous membrane and takes advantage of the difference in chemical reactivity between the compound of interest and oxygen to achieve the needed selectivity and permeation rate. In addition to reacting with the contaminant, the liquid must have extremely low vapor pressure to prevent loss by evaporation, and it must have low viscosity to allow diffusion across the membrane. As part of the development, RSI will prepare and characterize new functionalized liquid sorbents with near zero vapor pressure, and evaluate their effectiveness for ammonia and formaldehyde removal.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Reaction Systems, LLC	Lead Organization	Industry	Golden, Colorado
● Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
Colorado	Texas

Project Transitions

**June 2016:** Project Start**December 2016:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/140063>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Reaction Systems, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

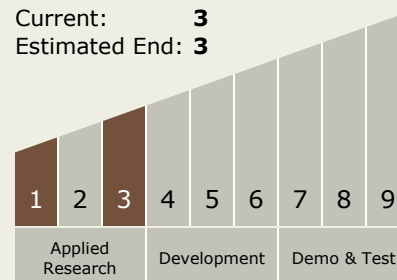
Carlos Torrez

Principal Investigator:

David Wickham

Technology Maturity (TRL)

Start: **1**
 Current: **3**
 Estimated End: **3**

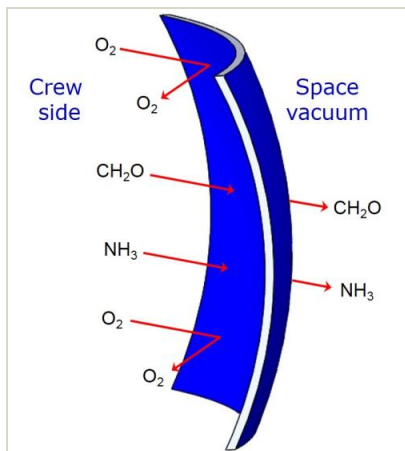


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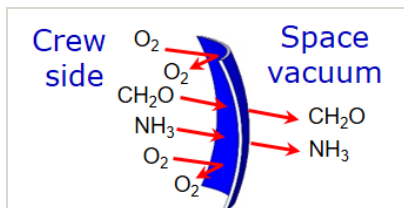
Images



Briefing Chart Image

Advanced Supported Liquid Membranes for Ammonia and Formaldehyde Control in Spacesuits, Phase I

(<https://techport.nasa.gov/image/128413>)



Final Summary Chart Image

Advanced Supported Liquid Membranes for Ammonia and Formaldehyde Control in Spacesuits, Phase I Project Image (<https://techport.nasa.gov/image/136648>)

Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
 - └ TX06.2 Extravehicular Activity Systems
 - └ TX06.2.2 Portable Life Support System

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System